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## Pennsylvanian Section at Crescent, Iowa

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*Iowa State Conservation Commission*

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## PENNSYLVANIAN SECTION AT CRESCENT, IOWA

L. W. Wood

The town of Crescent is located in Pottawattamie County, about eight miles north of Council Bluffs. Rock exposures at the foot of the bluffs bordering the valley of Missouri River southwest of Crescent have long been known to geologists, and are mentioned and described in detail by Udden.<sup>1</sup>

An extensive program of secondary road improvement in southwestern Iowa has created a strong demand for road surfacing materials, and particularly for limestone, since rock quarries are well adapted to the use of a large quantity of relief labor. These conditions have led the Iowa State Highway Commission to make an intensive study of all possibilities for quarrying rock in that region. Recent work by the Nebraska Geological Survey<sup>2</sup> indicated that the beds exposed at Crescent were probably assignable to the upper portion of the Kansas City stage of the Missouri series. The Kansas City stage carries a high proportion of limestone, both in outcrops and in well sections. For this reason it was decided to put down one or more test pits to determine the character and thickness of the beds exposed, and if possible, to find out something of the strata lying below the exposure.

Two test pits were put down, both along the east edge of the Chicago and Northwestern Railway right-of-way, in SE $\frac{1}{4}$  SE $\frac{1}{4}$  Section 27, Crescent Township, about 750 feet apart. A northward dip of the beds enabled the south pit to start at a horizon near the bottom of the north pit, so that the logs of both pits can be combined into one section. Following is the combined section:

| Number |  | Feet      |
|--------|--|-----------|
| 1      | Pleistocene deposits, loess above, glacial till and interglacial sand and gravel below, resting on a weathered rock surface. | 80 (App.) |
| 2 a    | Limestone, gray, weathers brownish, probably originally one ledge, hard, sound, fossiliferous.                               | 1.5       |
| b      | Shale, calcareous, fossiliferous, perhaps originally a shaly limestone.  | 0.6       |
| c      | Limestone, gray, fine-grained, hard, the lower part a fossiliferous shaly stone, grading to the member below.                | 1.5       |

<sup>1</sup> Udden, J. A., *Geology of Pottawattamie County: Iowa Geological Survey*, Vol. XI, pp. 227-228.

<sup>2</sup> Condra, C. E., *The Missouri Valley Traverse in Iowa, North of the Jones Point Deformation: Nebraska Geological Survey, Paper Number 2*, pp. 17-21.

|     |  |      |
|-----|--|------|
| d   | Shale, yellowish-brown, calcareous, fossiliferous, perhaps originally a shaly limestone.   | 1.0  |
| e   | Limestone, gray, fine-grained, hard, sound, fossiliferous, two beds separated by a 2-inch seam of brown shale.   | 1.8  |
| 3 a | Shale, drab, weathers buff, hard, calcareous, partly a soft shaly limestone.   | 3.5  |
| b   | Shale, dark gray, clayey, except at bottom which is calcareous and harder.   | 3.5  |
| 4   | Limestone, probably one bed when unweathered, but divisible into three zones of approximately equal thickness. The upper zone is gray, finely granular, with fusulinids and other fossil fragments showing osagea, hard, sound, and with frequent small calcite nests. The middle zone is of more irregular or pseudo-conglomeratic texture, of hard, gray, fine-grained limestone with irregular seams and small pockets of greenish shale totaling perhaps 30 percent. The lower zone is more yellowish or brownish in color, of granular texture, not so hard as the above, with the lower one or two feet grading to a calcareous fossiliferous shale. | 10.0 |
| 5 a | Shale, gray, weathers yellowish, hard, calcareous, with <i>Triticites irregularis</i> .  | 1.4  |
| b   | Shale, black, hard, with thin lenses of light gray sandy shale giving a distinctive appearance.  | 2.2  |
| c   | Limestone, gray, hard, a thin but strong ledge.  | 0.4  |
| d   | Shale, gray to greenish, non-fossiliferous, clayey and not very hard.  | 11.0 |
| 6 a | Limestone, gray, hard, sound, fossiliferous, rather fine-grained.  | 3.7  |
| b   | Shale, calcareous, softened by water seepage, with <i>Composita subtilita</i> .  | 0.3  |
| c   | Limestone, darker color than 6a, coarse-grained, hard, sound, fossiliferous, to bottom of south test pit.  | 3.5  |
| d   | Limestone, gray, hard, with about 0.4 feet of shale 2 feet above the bottom, drill hole below bottom of test pit.  | 8.5  |

The top of No. 2 of this section is at elevation 1000 at the north test pit. The northward dip of the beds amounts to about 9 feet in 750 feet.

Comparison of this section with that given by Udden<sup>3</sup> indicates that his No. 1 is equivalent to the upper part of No. 4 of the present section. His No. 2 is equivalent to the present No. 3b, though he found it about 1.5 feet thicker. His Nos. 3 and 4 correspond to the present No. 3a, and his No. 5 to the present No. 2. It appears that his section was measured at a point near the south test pit, while the equivalent members of the present section were observed at the north test pit, some 750 feet away; this may account for the differences in detail between the two sections.

The records of these two test pits have been carefully studied

<sup>3</sup> *Op. cit.*

and samples of rock from them examined by E. C. Reed of the Nebraska Geological Survey. The writer is indebted to Mr. Reed for the identification of the fossils named in the present section, and also for details as to amount and character of insoluble residue in some of the samples.

Reed is of the opinion <sup>4</sup> that No. 6 of the present section represents the Winterset limestone, No. 5 the Cherryvale shale, and Nos. 2 to 4 the Westerville limestone. The Westerville as defined by him includes two limestone members separated by a shale (No. 3 of the present section), and is equivalent to Nos. 17 to 19, inclusive, of the writer's general section for Madison County, Iowa,<sup>5</sup> there tentatively designated as lower DeKalb.

A large majority of the evidence available supports Reed's correlation. Without discussing the evidence in detail, it may be said that the thickness and character of the beds, even in many small particulars, is the same as that of equivalent strata exposed along the lower Platte valley and described in recent Nebraska Geological Survey reports;<sup>6</sup> fossil species, so far as studied, show satisfactory correspondence with the fauna on Platte valley; and the amount and character of insoluble residues is similar. The absence of chert in the upper Winterset of the present section is unusual for that horizon, but it is possible that an exposure of such small extent as the sides of a test pit might fail to show chert nodules, even though they were present only a few feet away.

Reed's correlation is therefore accepted and the Crescent section accordingly referred to the Winterset, Cherryvale, and Westerville members of the Kansas City stage. The occurrence of these beds at an unusually high elevation here is explained by their probable location on the northward extension of Condra's Nehawka anticline.<sup>7</sup>

IOWA STATE HIGHWAY COMMISSION,  
AMES, IOWA.

<sup>4</sup> Reed, E. C., private correspondence, 1936.

<sup>5</sup> Wood, L. W., A General Section for the Missouri Series in Madison County, Iowa: Iowa Academy of Science Proceedings, 1933, p. 119.

<sup>6</sup> *E.g.*, Condra, G. E., Correlation of the Pennsylvanian Beds in the Platte and Jones Point Sections of Nebraska: Nebraska Geological Survey, Bulletin 3, Second Series.

<sup>7</sup> Condra, G. E., The Stratigraphy of the Pennsylvanian System in Nebraska: Nebraska Geological Survey, Bulletin 1. Second Series, p. 15.